



# Ship Manpower Analysis & Requirements

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# **GOAL:**

**Provide a design process/tool set that allows engineers or evaluators to assess ship manpower & workload requirements for future combatants**

***Before Any Metal is Bent!***

**Develop a scaleable architecture permitting manpower analyses for varying warfighting postures; execution of multiple missions; ship organization & team structures; changes in ROCs/POEs; in-port work activities**

# The Big Picture



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In order to avoid this fate, we need to provide the tools and capabilities to support the process

# APPROACH

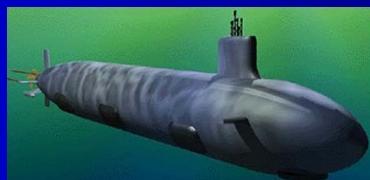
Work With Existing Systems

Develop New  
Solutions

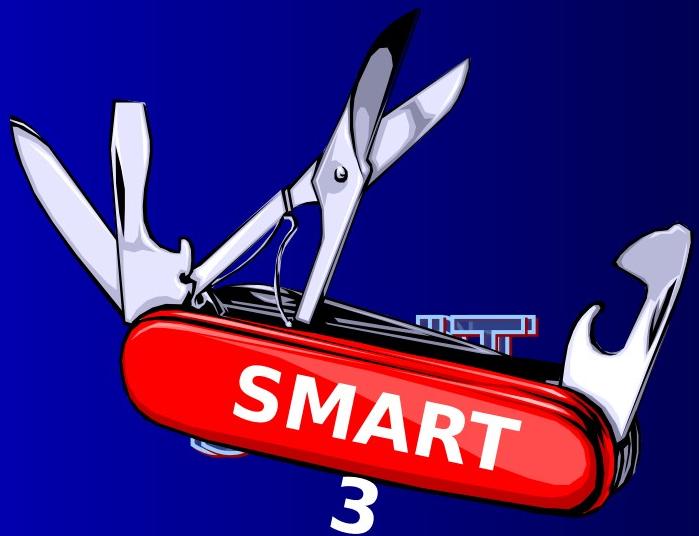
That Work  
Together



**Manpower  
Ship Design  
Maintenance Models** To Evaluate New  
Acquisitions



# Leverage



# SMART Challenge

- What is the *BEST* crew composition for a new system?
  - Skills
  - Size
  - Cost
- Complications!
  - Early answers required
  - Fast turn-around required
  - Range of missions and environments

# Features



Smart Build 3

Ship  
Manpower  
Analysis and  
Requirements  
Tools

NAVAL SEA SYSTEMS COMMAND  
**NSWC**  
Naval Surface Warfare Center  
DAHLGREN DIVISION

- Customers:
  - Program Managers (PEO(S))
  - As well as designers
- Stochastic Maintenance Model (PM, CM, FM)
- Data Organizer Model
- Scenario Based to show simultaneity
- Skill based

PM = Preventive Maintenance  
CM = Corrective Maintenance  
FM = Facilities Maintenance  
OM = Operational Manning

# SMART Approach

- Focus on skills needed to perform tasks

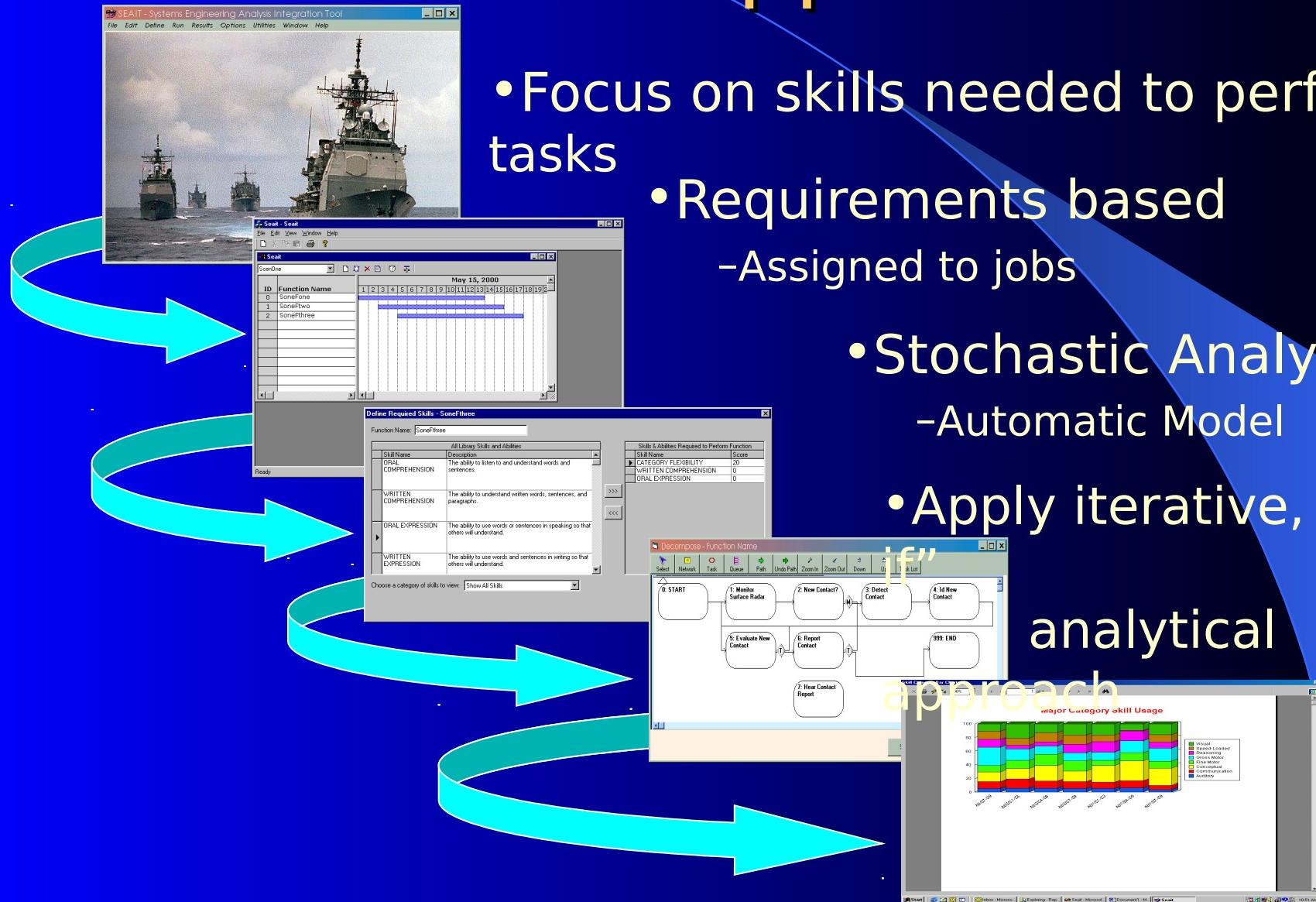
- Requirements based
  - Assigned to jobs

- Stochastic Analysis

- Automatic Model

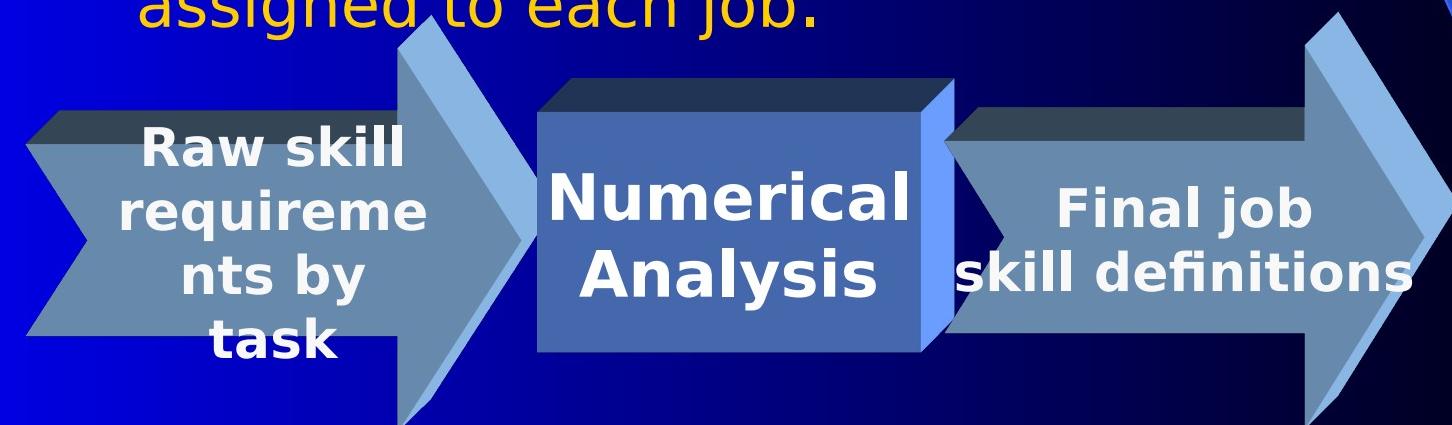
- Apply iterative, “what if”

analytical approach



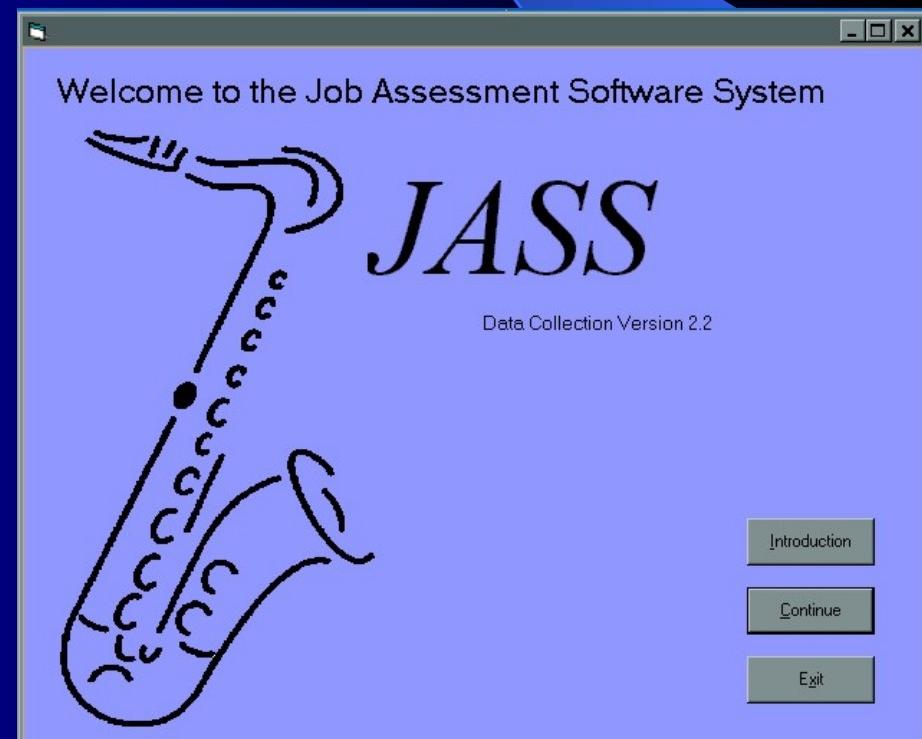
# SMART Features

- Jobs are Described by Skill Requirements
  - Jobs will be composed of skill groupings, using current Navy profiles as a starting point.
  - Responsibilities are driven out of the tasks assigned to each job.



# Skill Determination

- Based on Fleishman's Skill Taxonomy



Microsoft Access - [Scales : Table]

File Edit View Insert Format Records Tools Window Help

[Standard toolbar icons]

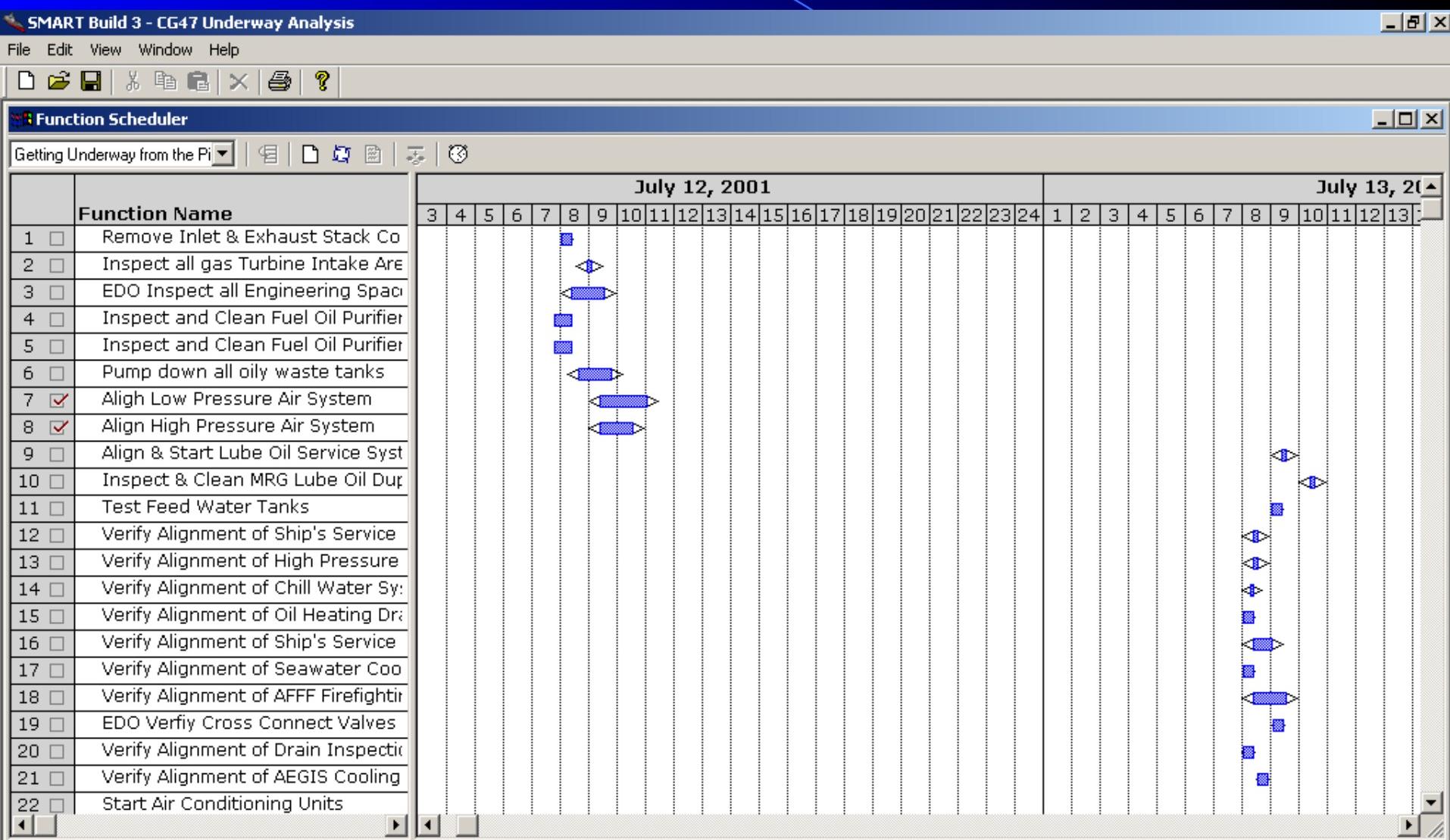
**ScaleName**    **Description**    **Anch1Desc**    **Anch2Desc**    **Anch3Desc**    **Anch4Desc**

ScaleName	Description	Anch1Desc	Anch2Desc	Anch3Desc	Anch4Desc
WRIST-FINGER SPEED	The ability to make fast, simple, repeated movements of the fingers, hands, and wrists. It involves little, if any, accuracy or eye-hand coordination.	Key telegraph at 25 words per minute (5.3)	Scramble eggs with a fork (3.0)	Use a pencil sharpener (2.0)	
FINGER DEXTERITY	The ability to make skillful, coordinated movements of the fingers of one or both hands and to grasp, place, or move small objects. This ability involves the degree to which these finger movements can be carried out quickly.	Play a classical flamenco piece on the guitar (5.8)	Untie a knot in a long-awaited package (3.5)	Put coins in a parking meter (1.5)	
MANUAL DEXTERITY	The ability to make skillful coordinated movements of one hand, a hand together with its arm, or two hands to grasp, place, move, or assemble objects like hand tools or blocks. This ability involves the degree to which these arm-hand movements can be carried out quickly. It does not involve moving machine or equipment controls like levers.	Perform open-heart surgery (6.8)	Pack oranges in crates as rapidly as possible (4.1)	Tie a necktie (2.4)	
ARM-HAND STEADINESS	The ability to keep the hand and arm steady. It includes steadiness while making an arm movement as well as while holding the arm and hand in one position. This ability does not involve strength or speed.	Cut facets in diamonds (6.3)	Thread a needle (4.1)	Light a cigarette (1.7)	
MULTI-LIMB COORDINATION	The ability to coordinate movements of two or more limbs (for example, two legs, or one leg and one arm), such as in moving equipment controls. Two or more limbs are in motion while the individual is sitting, standing or lying down.	Play drums in a jazz band (5.7)	Operate a forklift in the warehouse (4.1)	Operate a sewing machine with a foot treadle (2.9)	
EXTENT FLEXIBILITY	The ability to bend, stretch, twist, or reach out with the body, arms, or legs.	Win a limbo championship (6.0)	Reach out for something on the top shelf (3.5)	Reach for a soda in the back of a refrigerator (2.0)	
DYNAMIC FLEXIBILITY	The ability to bend, stretch, twist, or reach out with the body, arms, and/or legs, both quickly and repeatedly.	Do the butterfly stroke in a championship swim	Shovel coal in a furnace (3.9)	Fill a bag with shells at the seashore (2.2)	
SPEED OF LIMB MOVEMENT	Involves the speed with which a single movement of the arms or legs can be made and/or repeated. This ability does not include accuracy, careful control, or coordination of movement.	Play the bongo drums in a band (5.5)	Swat a fly with a fly swatter (4.2)	Saw through a thin piece of wood (2.3)	

# Skill Examples

- ORAL COMPREHENSION
- WRITTEN COMPREHENSION
- ORAL EXPRESSION
- WRITTEN EXPRESSION
- MEMORIZATION
- PROBLEM SENSITIVITY
- ORIGINALITY
- FLUENCY OF IDEAS
- FLEXIBILITY OF CLOSURE
- SELECTIVE ATTENTION
- SPATIAL ORIENTATION
- NEAR VISION
- FAR VISION
- NIGHT VISION
- VISUAL COLOR DISCRIMINATION
- PERIPHERAL VISION
- DEPTH PERCEPTION
- GENERAL HEARING
- WRIST-FINGER SPEED
- FINGER DEXTERITY
- MANUAL DEXTERITY
- ARM-HAND STEADINESS
- MULTI-LIMB COORDINATION

# Gantt Charting Feature

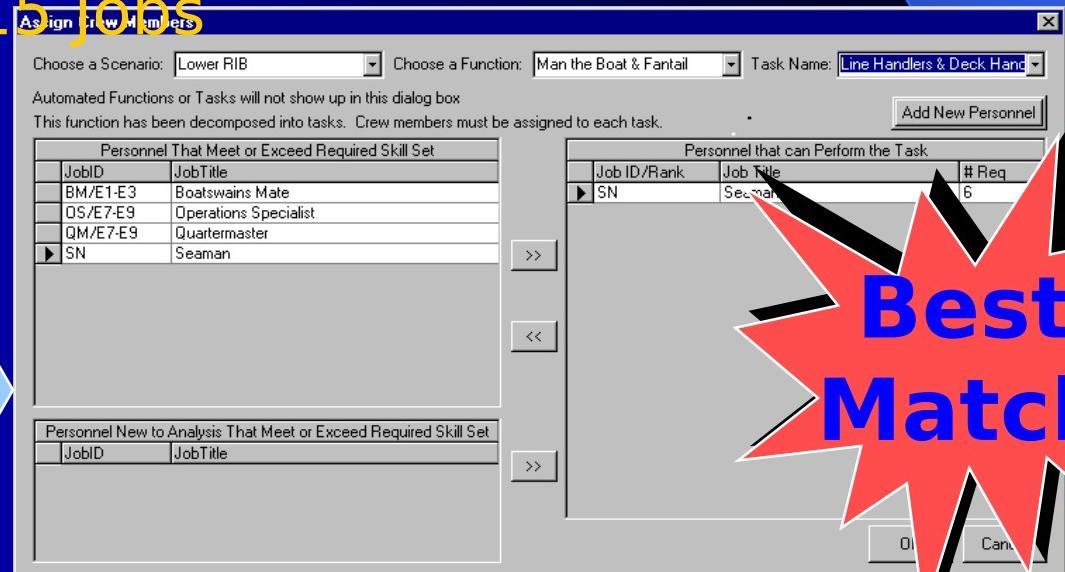


# SMART Features

- Comparison of required crew characteristics to existing Jobs (Rank & Rating)
  - Developed and stored skill profiles for existing 115 Jobs

Function/Task  
skill  
requirements

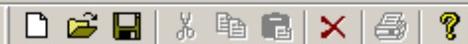
Existing  
inventory  
skill  
definitions



# Assign Crew Type

SMART Build 3 - CG47 Underway Analysis

File Edit Define Run Results Options Utilities View Help



**Assign Crew Members**

Choose a Scenario: Getting Underway from the ▾ Choose a Function: Remove Inlet & Exhaust St ▾

Automated Functions or Tasks will not show up in this dialog box

Add New Personnel

Personnel That Meet or Exceed Required Skill Set	
Job ID/Rank	Job Title
► TM/E7-E9	Torpedomans Mate
TM/E4-E6	Torpedomans Mate
TM/E1-E3	Torpedomans Mate
STG/E7-E9	Sonar Technician - Surface
STG/E4-E6	Sonar Technician - Surface
STG/E1-E3	Sonar Technician - Surface
SN	Seaman
SM/E7-E9	Signalman
SM/E4-E6	Signalman
SM/E1-E3	Signalman
SK/E7-E9	Storekeeper

>>

Personnel that can Perform the Task		
Job ID/Rank	Job Title	# Req
► FN	Fireman	1
GSM/E1-E3	Gas Turbine - Mechanical	1
GSM/E4-E6	Gas Turbine - Mechanical	1

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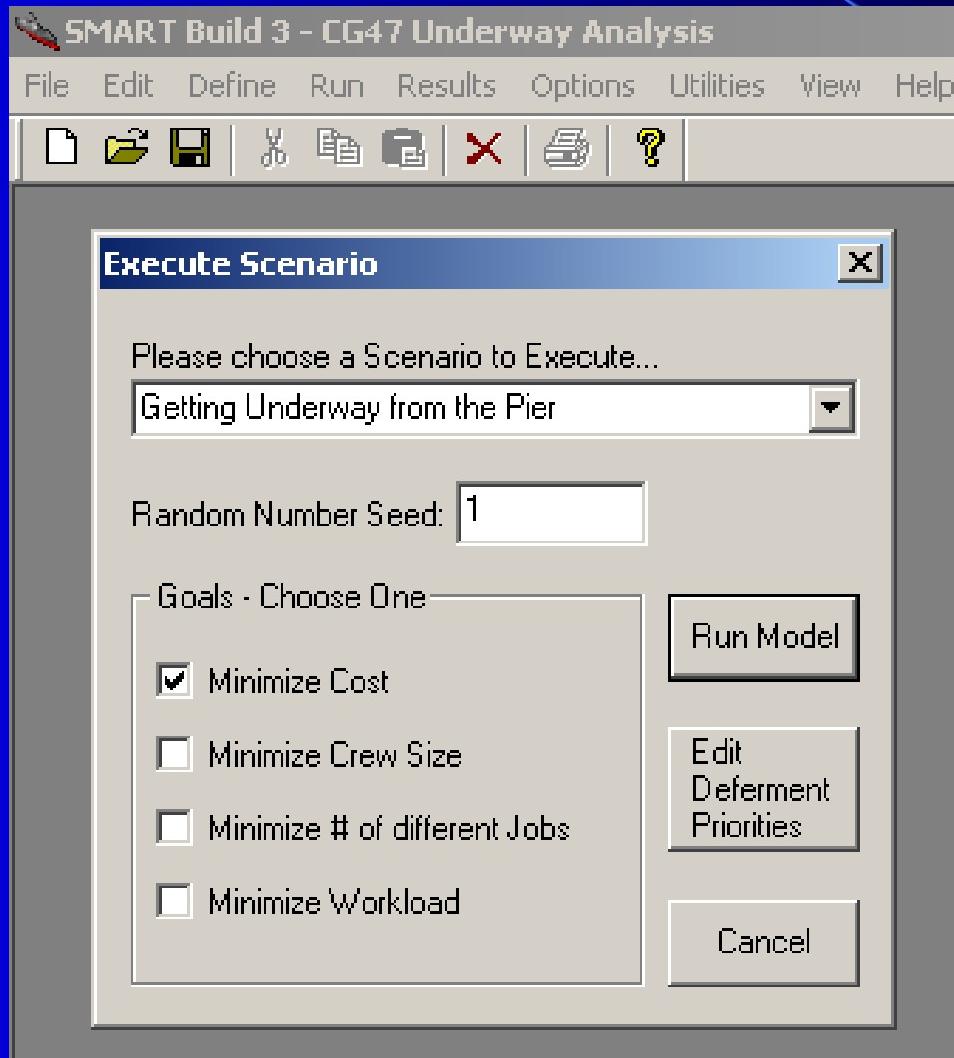
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Personnel New to Analysis That Meet or Exceed Required Skill Set

Job ID/Rank	Job Title

OK Cancel

# Optimization Options

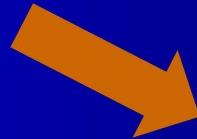


# Designers & Recruiters

**SMART**



**SKILLS**



**Rate, Rating, NEC**



**Recruiting  
Classification**

# Occupational Standards Cross-Referencer

## PRELIMINARY

### First Goal: Gap Analysis

- Macros compare the text in the occupational standards to the list of OUS functions that are supported.

# Status

**Part of ONR Capable Manpower FNC  
-DTOOLS (Cancelled)**

## Build2

- Undergoing Validation

## Build3

- Initial Design Complete - Ready for Review, Validation



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Micro Analysis & Design